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MECHANICAL PROPERTY DATA 15-5PH (H1025) STAINLESS STEEL
ALLOY: HOT-ROLLED PLATE(U) DAYTON UNIV OH RESEARCH INST
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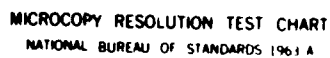
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15-5PH (H1025) STAINLESS STEEL ALLOY

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HOT-ROLLED PLATE

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15-5PH (H1025) Stainless Steel Alloy

Material Description

This 15-5PH Stainless Steel Alloy, heat-treated to the H1025 condition was provided by G. O. Carlson, Thorndale, Pennsylvania. The plates were received in thicknesses from 0.215 to 2.579 inches, widths varying from 10 to 16 inches, and lengths varying from 35 to 78 inches.

The average chemical composition of this lot is as follows:

<u>Chemical Composition</u>	<u>Percent Weight</u>
Carbon	0.037
Manganese	0.32
Phosphorus	0.023
Sulfur	0.004
Silicon	0.43
Chromium	14.59
Nickel	4.73
Copper	3.27
Columbium	0.23
Tantalum	0.01
Iron	Balance

Processing and Heat Treating

→ The 15-5PH stainless steel alloy was obtained as hot-rolled plate that was solution annealed and pickled. Each plate was heat-treated separately to the H1025 condition.

Results

② → The average values for each property are listed in Table 1 by plate direction. Due to the large numbers of data points (50 each from multiple heats for notched and unnotched specimens), only fatigue bands are presented in Figures 1 and 2. The long transverse fatigue data were generated from one heat only and are presented as curves in Figures 3 and 4.

Table 1
15-5PH Stainless Steel Plate
Condition: H1025^(a)
R.T.

Properties	Plate Direction		
	Longitudinal	Long Transverse	Short Transverse
<u>Tension</u>			
TUS, ksi (MPa)	171.0 (1179)	171.4 (1182)	--
TYS, ksi (MPa)	165.6 (1142)	166.0 (1145)	--
RA, percent	58.5	57.6	--
e, percent in 2 in. (50.8 mm)	15.0	14.8	--
E, 10 ³ ksi (GPa)	28.66 (197.6)	28.72 (198)	--
<u>Compression</u>			
CYS, ksi (MPa)	175.6 (1210.8)	175.3 (1208.7)	174.9 (1206) ^(b)
E _c , 10 ³ ksi (GPa)	29.85 (205.8)	29.84 (205.7)	30.03 (207.1) ^(b)
<u>Shear</u>			
SUS, ksi (MPa) ^(c)	114.3 (788)	113.2 (781)	--
SUS, ksi (MPa) ^(d)	108.1 (745)	109.0 (752)	--
<u>Bearing</u>			
e/D = 1.5			
BUS, ksi (MPa)	287.3 (1981)	287.2 (1980)	--
BYS, ksi (MPa)	246.1 (1696)	246.3 (1698)	--
e/D = 2.0			
BUS, ksi (MPa)	368.4 (2540)	367.8 (2536)	--
BYS, ksi (MPa)	286.7 (1977)	289.1 (1993)	--

- (a) Values are average of triplicate room temperature tests conducted at the University of Dayton Research Institute under the subject contract.
- (b) Compression tests in short transverse direction conducted for two heats, the plate thicknesses of which were greater than 1.5 inches.
- (c) Full thickness tensile shear tests from three heats (plates), the plate thicknesses of which were less than 0.3 inch.
- (d) 0.25 inch diameter double pin shear tests from seven heats (plates), the plate thicknesses of which were greater than 0.3 inch.

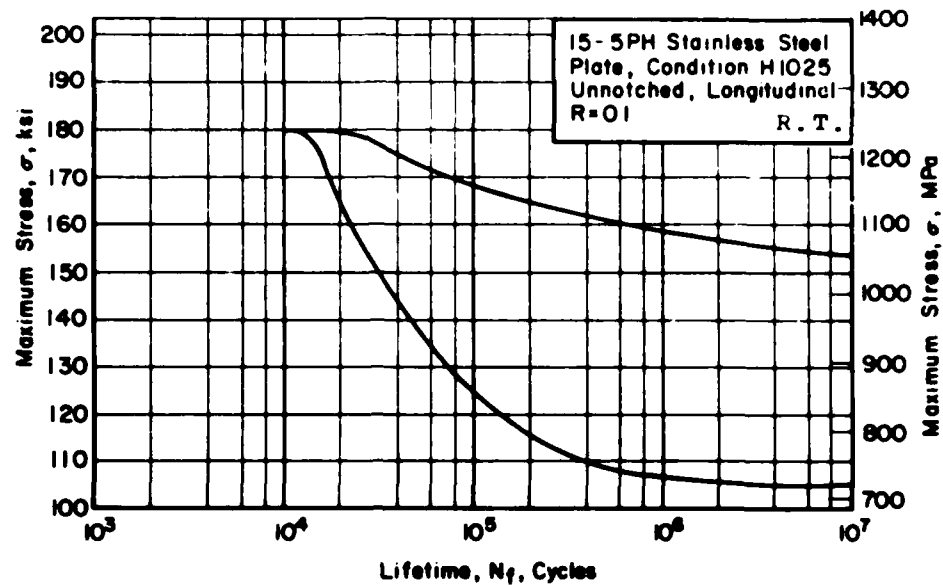


Figure 1. Axial load fatigue data of unnotched 15-5PH stainless steel (H1025, longitudinal).

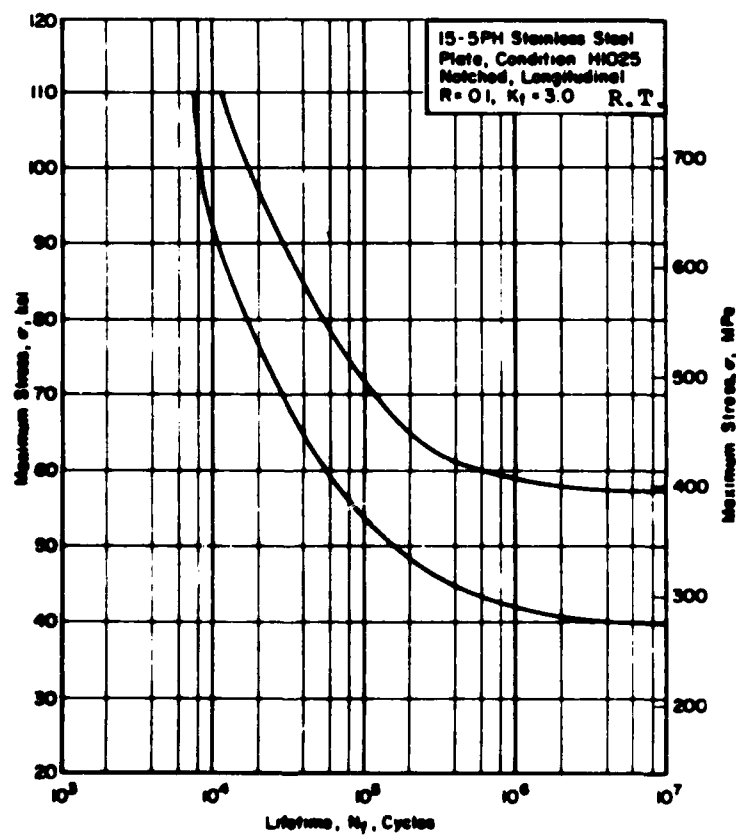


Figure 2. Axial load fatigue data of notched 15-5PH stainless steel (H1025, longitudinal).

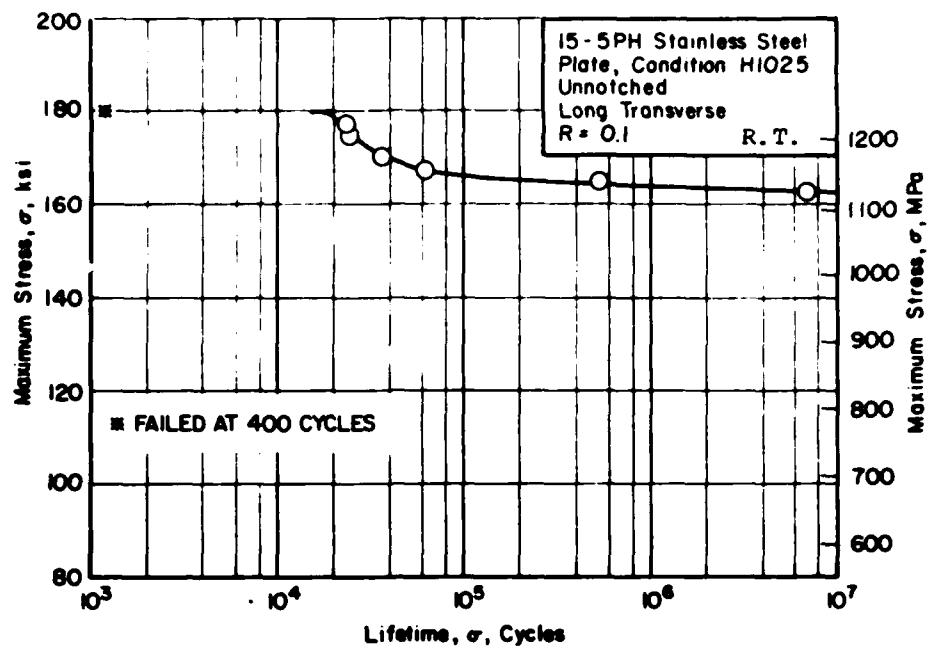


Figure 3. Axial load fatigue data of unnotched 15-5PH stainless steel (H1025, long transverse).

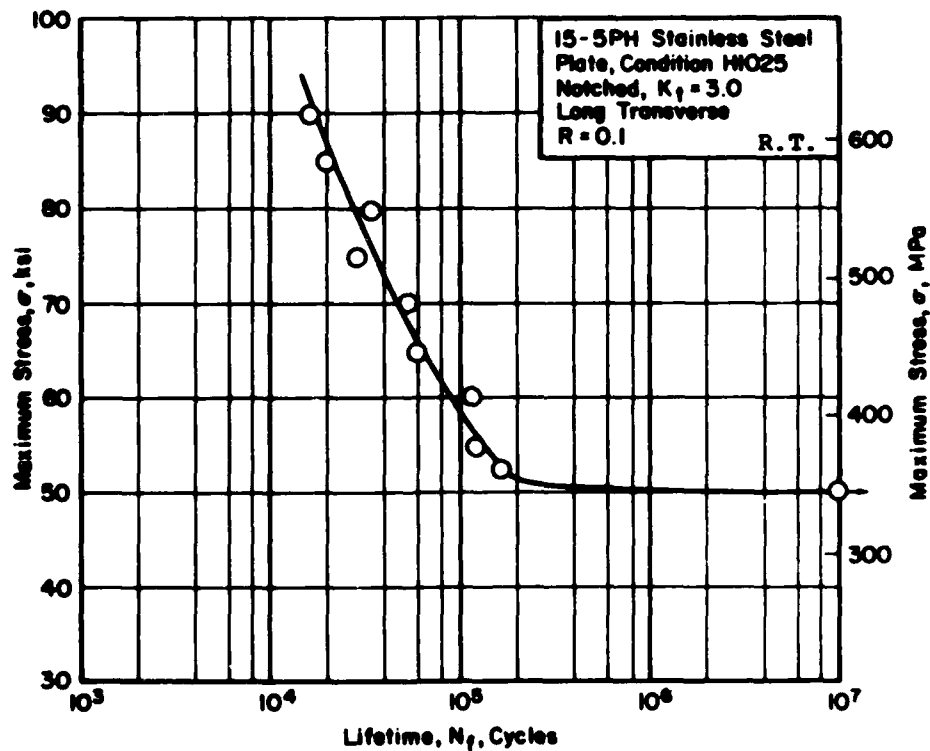


Figure 4. Axial load fatigue data of notched 15-5PH stainless steel (H1025, long transverse).